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EXAMINER	
GRAYBILL, DAVID E	

ART UNIT	PAPER NUMBER
2822	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/023,049	CHER 'KHNG ET AL.	
	Examiner	Art Unit	
	David E. Graybill	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17 and 58-64* is/are pending in the application.

4a) Of the above claim(s) *3 and 6-8* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,5,9-17 and 58-64* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1 page*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The amendment to the claims filed on 3-3-6 does not comply with the requirements of 37 CFR 1.121(c) because claim 9 is not submitted with markings to indicate all the changes that have been made relative to the immediate prior version of the claim. Specifically, the text of the added subject matter "contacts;" at line 17, is not shown by underlining the added text. Amendments to the claims filed on or after July 30, 2003 must comply with 37 CFR 1.121(c) which states:

> (c) *Claims.* Amendments to a claim must be made by rewriting the entire claim with all changes (*e.g.*, additions and deletions) as indicated in this subsection, except when the claim is being canceled. Each amendment document that includes a change to an existing claim, cancellation of an existing claim or addition of a new claim, must include a complete listing of all claims ever presented, including the text of all pending and withdrawn claims, in the application. The claim listing, including the text of the claims, in the amendment document will serve to replace all prior versions of the claims, in the application. In the claim listing, the status of every claim must be indicated after its claim number by using one of the following identifiers in a parenthetical expression: (Original), (Currently amended), (Canceled), (Withdrawn), (Previously presented), (New), and (Not entered).
>
> (1) *Claim listing.* All of the claims presented in a claim listing shall be presented in ascending numerical order. Consecutive claims having the same status of "canceled" or "not entered" may be aggregated into one statement (*e.g.*, Claims 1-5 (canceled)). The claim listing shall commence on a separate sheet of the amendment document and the sheet(s) that contain the text of any part of the claims shall not contain any other part of the amendment.
>
> (2) *When claim text with markings is required.* All claims being currently amended in an amendment paper shall be presented in the claim listing, indicate a status of "currently amended," and be submitted with markings to indicate the changes that have been made relative to the immediate prior version of the claims. The text of any added subject matter must be shown by underlining the added text. The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters. The text of any deleted subject matter must be shown by being placed within double brackets if strike-through cannot be easily perceived.

> Only claims having the status of "currently amended," or "withdrawn" if also being amended, shall include markings. If a withdrawn claim is currently amended, its status in the claim listing may be identified as "withdrawn—currently amended."
>
> (3) *When claim text in clean version is required.* The text of all pending claims not being currently amended shall be presented in the claim listing in clean version, *i.e.*, without any markings in the presentation of text. The presentation of a clean version of any claim having the status of "original," "withdrawn" or "previously presented" will constitute an assertion that it has not been changed relative to the immediate prior version, except to omit markings that may have been present in the immediate prior version of the claims of the status of "withdrawn" or "previously presented." Any claim added by amendment must be indicated with the status of "new" and presented in clean version, *i.e.*, without any underlining.
>
> (4) *When claim text shall not be presented; canceling a claim.*
>
> (i) No claim text shall be presented for any claim in the claim listing with the status of "canceled" or "not entered."
>
> (ii) Cancellation of a claim shall be effected by an instruction to cancel a particular claim number. Identifying the status of a claim in the claim listing as "canceled" will constitute an instruction to cancel the claim.
>
> (5) *Reinstatement of previously canceled claim.* A claim which was previously canceled may be reinstated only by adding the claim as a "new" claim with a new claim number.

Because the response appears to be bona fide, but through an apparent oversight or inadvertence the response is non-compliant, and in order to continue to afford applicant the benefit of compact prosecution, the requirement to comply with the response within a one month time limit is waived, the amendment is entered, and the claims are examined on the merits.

In the rejections infra, generally, reference labels are recited only for the first recitation of identical claim elements.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 1, 4, 5, 9-12, 14-17 and 62-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yew (6137164).

At column 4, line 52 to column 6, line 37; column 7, lines 3-18; and Abbot (6337445), incorporated by reference; column 7, line 33 to column 8, line 67; column 9, line 1-22; column 10, lines 1-12; column 11, lines 16-20 and 38-50, Yew discloses the following:

A semiconductor package comprising: a substrate 420 comprising a first side, an opposing second side, a plurality of die contacts 411, 630 on the first side having first planar tip (end) portions, and a plurality of bonding sites 634 on the second side in electrical communication with the die contacts, each bonding site comprising an electrically conductive, bondable metal; a semiconductor die 401 on the first side comprising a plurality of pads 633 bonded to the first planar tip portions of the die contacts; and a plurality of external contacts 630 on the second side comprising second planar tip portions configured to facilitate bonding to mating electrodes 633 on a second substrate 402, each external contact comprising a multi layered metal bump 805 (Abbott) including a first metal layer 801 on a bonding site, a second metal layer 802 on the first metal layer, and a non-oxidizing outer layer 803 on the second metal layer; each external contact having a height H on the substrate equal to a combined thickness of the bonding site, the first metal layer, the second metal layer and the outer layer; wherein the electrically conductive, bondable metal comprises copper "copper traces having a gold flash," the first metal layer comprises copper, the second metal layer comprises nickel, and the non-oxidizing outer layer comprises gold; wherein the substrate comprises a material selected from the group consisting of organic polymer materials, epoxy resins "FR-4," and polyimide resins.

A semiconductor package comprising: a substrate having a first side and an opposing second side; a plurality of die contacts on the first side in a pattern, and a plurality of external contacts on the second side in an array in electrical communication with the die contacts, each die contact and each external contact comprising a multi layered metal bump having a planar tip portion; each die contact and each external contact including a base metal layer 801, a bump metal layer 802 on the base metal layer and a non-oxidizing outer metal layer 803 on the bump metal layer; and a semiconductor die flip chip 401 mounted to the first side, the die comprising a plurality of pads in the pattern bonded to the die contacts; the die contacts and the external contacts sized and shaped to facilitate bonding of the die contacts to the pads, to facilitate bonding of the external contacts to a second substrate; an encapsulant 450 on the substrate encapsulating the die and the first side; wherein the base metal layer comprises copper, the bump metal layer comprises nickel, and the non-oxidizing outer metal layer comprises gold; an inherent solder mask 450 on the second side inherently configured to electrically insulate the external contacts.

A semiconductor package comprising: a substrate having a first side, and an opposing second side; a plurality of die contacts on the first side comprising first multi layered metal bumps in a pattern having generally planar first tip portions (illustrated in FIG. 6A); a plurality of bonding sites

on the second side in an array in electrical communication with the die contacts, each bonding site comprising an electrically conductive, bondable metal 634; a plurality of external contacts on the bonding sites in electrical communication with the die contacts comprising second multi layered metal bumps having generally planar second tip portions (illustrated in FIG. 6A) configured to facilitate bonding of the package to a supporting substrate 402, the external contacts having a height H on the substrate; and a semiconductor die flip chip 401 mounted to the substrate, the die comprising a plurality of bond pads in the pattern bonded to the die contacts; wherein each first multi layered metal bump and each second multi layered metal bump comprises a copper layer 801, a nickel layer 802 and a gold layer 803; an encapsulant 450 on the substrate encapsulating the die; wherein the bonding sites and the external contacts are in a grid array.

An electronic assembly comprising: a supporting substrate 402 comprising a plurality of electrodes 633; and a semiconductor package comprising a substrate 420 having a first side and an opposing second side, a plurality of die contacts 411, 630 on the first side comprising first multi layered metal bumps having generally planar first tip portions, a plurality of bonding sites 634 on the second side in electrical communication with the die contacts comprising an electrically conductive bondable metal, a semiconductor die 401 bonded to the die contacts in a flip chip configuration,

and a plurality of external contacts 630 on the bonding sites comprising second multi layer metal bumps having generally planar second tip portions bonded to the electrodes; each external contact having a height H on the substrate equal to a combined thickness of a bonding site and a multi layer metal bump; wherein each die contact comprise a copper layer, a nickel layer and a gold layer; wherein each external contact comprise a copper layer, a nickel layer and a gold layer.

To further clarify the disclosure of an inherent solder mask 450 on the second side inherently configured to electrically insulate the external contacts, it is noted that the language "solder mask" and "to electrically insulate the external contacts" are statements of intended use that do not appear to result in a structural difference between the claimed solder mask and 450. Further, because 450 appears to have the same structure as the claimed solder mask, it appears to be inherently capable of being used for the intended uses, and the statements of intended use do not patentably distinguish the claimed solder mask from 450. The manner in which a product operates is not germane to the issue of patentability of the product; Ex parte Wikdahl 10 USPQ 2d 1546, 1548 (BPAI 1989); Ex parte McCullough 7 USPQ 2d 1889, 1891 (BPAI 1988); In re Finsterwalder 168 USPQ 530 (CCPA 1971); In re Casey 152 USPQ 235, 238 (CCPA 1967). And, claims directed to product must be distinguished from the prior art in terms of

structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does [or is intended to do]." Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). In any case, 450 is inherently configured to electrically insulate the external contacts because, as cited, it is disclosed as electrically insulating. Therefore, it inherently electrically insulates the external contacts at least from the space in which it occupies.

Although Yew does not appear to explicitly disclose the process limitations, "the height H selected to reduce an overall thickness T1 of the package," and, "the height H selected to reduce an overall thickness T1 of the package and to insure a planarity of the package on the second substrate," the height H of Yew inherently possesses any structural characteristics imparted by these process limitations. See In re Fitzgerald, Sanders, and Bagheri, 205 USPQ 594 (CCPA 1980). In order to continue to afford applicant the benefit of compact prosecution, it is noted that, although as elucidated supra Yew discloses a second substrate 402 structure, the scope of the instant claims is not limited to a second substrate structure.

Furthermore, the language, "to reduce an overall thickness T1 of the package," and, "to insure a planarity of the package on the second substrate," is statements of intended use of the height H that do not appear to result in a structural difference between the claimed height H and the

height H of Yew. Further, because the height H of Yew appears to have the same structure as the claimed height, it appears to be capable of being used for the intended uses, and the statements of intended use do not patentably distinguish the claimed height H from the height H of Yew.

In any case, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to select any particular height H that is capable of being used for the intended uses of the height H because applicant has not disclosed that, in view of the applied prior art, the height H is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the product would possess utility using another height H. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Also, although Yew does not appear to explicitly disclose the process limitations, "the die contacts and the external contacts sized and shaped to reduce a thickness of the package . . . and to insure a planarity of the package on the second substrate," the contacts of Yew inherently possess any structural characteristics imparted by these process limitations.

Furthermore, the language, "to reduce a thickness of the package . . . and to insure a planarity of the package on the second substrate," is statements of intended use of the contacts that do not appear to result in a structural difference between the claimed contacts and the contacts of Yew. Further, because the contacts of Yew appear to have the same structure as the claimed contacts, they appear to be capable of being used for the intended uses, and the statements of intended use do not patentably distinguish the claimed contacts from the contacts of Yew.

In any case, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to provide the die contacts and the external contacts sized and shaped to reduce a thickness of the package and to insure a planarity of the package on the second substrate because applicant has not disclosed that, in view of the applied prior art, the particular dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical,

and it appears prima facie that the product would possess utility using other dimensions.

Also, although Yew does not appear to explicitly disclose the process limitation, "portions configured to facilitate . . . a planarity of the package on the supporting substrate," the portions of Yew inherently possess any structural characteristics imparted by the process limitation. In order to continue to afford applicant the benefit of compact prosecution, it is noted that, although as elucidated supra Yew discloses a supporting substrate 402 structure, the scope of claims 1-17 is not limited to a supporting substrate structure.

Furthermore, the language, "to facilitate . . . a planarity of the package on the supporting substrate," is a statement of intended use of the portions that does not appear to result in a structural difference between the claimed portions and the portions of Yew. Further, because the portions of Yew appear to have the same structure as the claimed portions, they appear to be capable of being used for the intended use, and the statement of intended use does not patentably distinguish the claimed portions from the portions of Yew.

In any case, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and

optimization to configure the portions to be capable of being used for the intended use of the portions because applicant has not disclosed that, in view of the applied prior art, the relevant portion configurations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the product would possess utility using other dimensions.

Claims 1, 4, 5, 9-12, 14-17 and 62-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yew as applied to claims 1, 4, 5, 9-12, 14-17 and 62-64 supra, and further in combination with Yoneda (20030006503).

As elucidated supra, Yew does not appear to explicitly disclose the height H selected to reduce an overall thickness T1 of the package.

Nevertheless, at paragraph 470, Yoneda discloses a process wherein bumps 342 having an inherent height H are selected to reduce an overall thickness T1 of a "package." In addition, it would have been obvious to use this process to provide the bumps of Yew because, as disclosed by Yoneda as cited, it would provide a thinner package.

Also, as elucidated supra, Yew does not appear to explicitly disclose the die contacts and the external contacts sized and shaped to reduce a thickness of the package.

Nevertheless, at paragraph 470, Yoneda discloses a process having die 311 contacts 342 and external (at least external to 311) contacts 342 sized and shaped to reduce a thickness of a "package." In addition, it would have been obvious to use this process to provide the contacts of Yew because, as disclosed by Yoneda as cited, it would provide a thinner package.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yew or Yew and Yoneda as applied to claim 1 supra, and further in combination with Hanaoka (20020030245).

Yew and the combination of Yew and Yoneda do not appear to explicitly disclose that the die contacts and external contacts are generally pyramidal in shape.

Regardless, at paragraphs 130, 132, 133, 166 and 201-209, Hanaoka discloses die 6 contacts 14 and external (at least external to 6) contacts 14 generally pyramidal in shape; each external contact comprising a multi layered metal bump including a first metal layer, a second metal layer on the first metal layer, and a non-oxidizing outer layer on the second metal layer. To further clarify the disclosure of a base metal layer, a bump metal layer and a non-oxidizing outer metal layer as cited, Hanaoka discloses, "as a conductive material for forming the conductive layer 8. [sic] a plurality of different kinds of metals (Ni+Cu or Ni+Au+Cu, for example) may be used. Thereby, the conductive layer 8 may be formed of multiple layers." Hence,

Hanaoka discloses the range of three metal layers: Ni, Au and Cu, in any order, and this range encompasses the claimed embodiment. Therefore, the range of Hanaoka anticipates the claimed embodiment.

Claims 58-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yew (6137164), and further in combination with Hanaoka (20020030245).

As cited supra, Yew discloses the following:

An electronic assembly comprising: a supporting substrate 402 comprising a plurality of electrodes 633; at least one semiconductor package on the supporting substrate comprising: a substrate 420 comprising a plurality of die contacts having first planar tip portions and a plurality of bonding sites comprising an electrically conductive, bondable metal; a semiconductor die on the substrate comprising a plurality of pads bonded to the die contacts on the substrate; and a plurality of external contacts on the bonding sites bonded to the electrodes on the substrate comprising multi layered metal bumps having second planar tip portions configured to facilitate bonding to the electrodes on the supporting substrate, each external contact including a first metal layer on a bonding site, a second metal layer on the first metal layer, and a non-oxidizing outer layer on the second metal layer; wherein the substrate and the package are configured as a multi chip module; wherein the first metal layer comprises copper, the

second metal layer comprises nickel, and the non-oxidizing outer layer comprises gold; wherein the die contacts comprise second multi layer metal bumps.

However, Yew does not appear to explicitly disclose generally pyramidal shaped bumps.

Regardless, as elucidated supra, Hanaoka discloses generally pyramidal shaped bumps. In addition, Hanaoka is applied for the reasons it was applied in combination with Yew supra.

Also, although Yew does not appear to explicitly disclose the process limitations, "portions configured . . . to reduce a thickness of the package, and to insure a planarity of the package on the supporting substrate," the contacts of Yew inherently possess any structural characteristics imparted by these process limitations.

Furthermore, the language "to reduce a thickness of the package, and to insure a planarity of the package on the supporting substrate," is statements of intended use of the contacts that do not appear to result in a structural difference between the claimed portions and the portions of Yew. Further, because the portions of Yew appear to have the same structure as the claimed portions, they appear to be capable of being used for the intended uses, and the statements of intended use do not patentably distinguish the claimed portions from the portions of Yew.

In any case, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to configure the portions to be capable of being used for the intended use of the portions because applicant has not disclosed that, in view of the applied prior art, the particular dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the product would possess utility using other dimensions.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yew and Hanaoka as applied to claim 9 supra, and further in combination with Yoneda (20030006503).

Yew and Hanaoka doe not appear to explicitly disclose a height H of each die contact and each external contact is about 5 μm.

Notwithstanding, at paragraph 470, Yoneda discloses that contact height is a result effective variable. Furthermore, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed height limitations because applicant has not disclosed that, in view of the applied prior art, the limitations are for a particular unobvious purpose,

produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another height.

Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanaoka (20020030245).

At paragraphs 130, 166 and 201-209, Hanaoka discloses a semiconductor package comprising: a substrate 6 having a first side and an opposing second side; a plurality of die contacts 14 on the first side in a pattern, and a plurality of external contacts 14 on the second side in an array in electrical communication with the die contacts, each die contact and each external contact comprising a multi layered metal bump having a planar tip portion; each die contact and each external contact including a base metal layer, a bump metal layer on the base metal layer and a non-oxidizing outer metal layer on the bump metal layer; and a semiconductor die flip chip 6 mounted to the first side, the die comprising a plurality of pads 14 in the pattern bonded to the die contacts; the die contacts and the external contacts sized and shaped to facilitate bonding of the die contacts to the pads, to facilitate bonding of the external contacts to a second substrate; an encapsulant 26 on the substrate encapsulating the die and the first side; wherein the base metal layer comprises copper, the bump metal layer comprises nickel, and the non-oxidizing outer metal layer comprises

gold; and a solder mask 26 on the second side configured to electrically insulate the external contacts.

To further clarify the disclosure of a base metal layer, a bump metal layer and a non-oxidizing outer metal layer wherein the base metal layer comprises copper, the bump metal layer comprises nickel, and the non-oxidizing outer metal layer comprises gold, as cited, Hanaoka discloses, "as a conductive material for forming the conductive layer 8. [sic] a plurality of different kinds of metals (Ni+Cu or Ni+Au+Cu, for example) may be used. Thereby, the conductive layer 8 may be formed of multiple layers." Hence, Hanaoka discloses the range of three metal layers: Ni, Au and Cu, in any order, and this range encompasses the claimed embodiment. Therefore, the range of Hanaoka anticipates the claimed embodiment.

Although Hanaoka does not appear to explicitly disclose the process limitations, "the die contacts and the external contacts sized and shaped to reduce a thickness of the package . . . and to insure a planarity of the package on the second substrate," the contacts of Hanaoka inherently possess any structural characteristics imparted by these process limitations.

Furthermore, the language, "to reduce a thickness of the package . . . and to insure a planarity of the package on the second substrate," is statements of intended use of the contacts that do not appear to result in a structural difference between the claimed contacts and the contacts of

Hanaoka. Further, because the contacts of Hanaoka appear to have the same structure as the claimed contacts, they appear to be capable of being used for the intended uses, and the statements of intended use do not patentably distinguish the claimed contacts from the contacts of Hanaoka.

In any case, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to provide the die contacts and the external contacts of Hanaoka sized and shaped to reduce a thickness of the package and to insure a planarity of the package on the second substrate because applicant has not disclosed that, in view of the applied prior art, the particular dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the product would possess utility using other dimensions.

Also, Hanaoka does not appear to explicitly disclose that a height H of each die contact and each external contact is about 5 μm.

Notwithstanding, at paragraphs 36, 104, 119, 181 and 195, Hanaoka discloses that package size is a result effective variable. In addition, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to

choose the particular claimed height limitation because applicant has not disclosed that, in view of the applied prior art, the limitation is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the process would possess utility using another height.

In the alternative, claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hanaoka as applied to claim 12 supra, and further in combination with Yoneda (20030006503).

As elucidated supra, Hanaoka does not appear to explicitly disclose that a height H of each die contact and each external contact is about 5 μm.

Nevertheless, at paragraph 470, Yoneda discloses that contact height is a result effective variable. Furthermore, as reasoned from well established legal precedent, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose the particular claimed height limitation because applicant has not disclosed that, in view of the applied prior art, the limitation is for a particular unobvious purpose, produces an unexpected result, or is otherwise critical, and it appears prima facie that the process would possess utility using another height.

Applicant's amendment and remarks filed 3-3-6 have been fully considered, are addressed by the rejections supra, and are further addressed infra.

Applicant argues that, "Yew et al. teaches away from bumps having planar tip portions and a reduced height," because, "In Yew et al. the external contacts for the package are in the form of solder balls 440."

This argument is respectfully traversed because Yew is not relied on for this disclosure. Specifically, Yew is relied on for a disclosure of external contacts 630, not external contacts in the form of solder balls 440. In any case, applicant does not elucidate, and it is not otherwise apparent, how this disclosure teaches away from the instant claimed invention.

Also, applicant asserts, "in the discussion on the polymer bumps 115 (Figure 3), at column 6, lines 32-34, Abbott et al. teaches away from bumps having planar tip portions and a reduced height."

This assertion is respectfully traversed because Yew is not relied on for a disclosure of polymer bumps 115. Also, there is no such teaching away from at the cited disclosure nor elsewhere in the disclosure. Although there is a "discussion on the polymer bumps 115," at column 6, lines 13-32, this disclosure, at most, merely discloses known nonpreferred embodiments. "A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other product for the same

use." In re Gurley, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994). A reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. Merck & Co. v. Biocraft Laboratories, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). To further clarify, a prior art opinion that a claimed invention is not preferred for a particular limited purpose, does not preclude utility of the invention for that or another purpose, or even preferability of the invention for another purpose. Moreover, even a teaching away from a claimed invention does not necessarily render the invention patentable. See Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998), where the court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed." Similarly, in In re Geisler, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997) applicant argued that the prior art taught away from use of a protective layer for a reflective article having a thickness within the claimed range of "50 to 100 Angstroms." Specifically, a patent to Zehender, which was relied upon to reject applicant's claim, included a statement that the thickness of the protective layer "should be not less than about [100 Angstroms]." The

court held that the patent did not teach away from the claimed invention. "Zehender suggests that there are benefits to be derived from keeping the protective layer as thin as possible, consistent with achieving adequate protection. A thinner coating reduces light absorption and minimizes manufacturing time and expense. Thus, while Zehender expresses a preference for a thicker protective layer of 200-300 Angstroms, at the same time it provides the motivation for one of ordinary skill in the art to focus on thickness levels at the bottom of Zehender's suitable range - about 100 Angstroms - and to explore thickness levels below that range. The statement in Zehender that [i]n general, the thickness of the protective layer should be not less than about [100 Angstroms] falls far short of the kind of teaching that would discourage one of skill in the art from fabricating a protective layer of 100 Angstroms or less. [W]e are therefore not convinced that there was a sufficient teaching away in the art to overcome [the] strong case of obviousness made out by Zehender." See MPEP 2144.05II and MPEP 2145, paragraph X.D..

Applicant also argues, "Hanaoka et al. also teaches placing external terminals 24 (Figure 2) in the form of solder balls on the connecting portion 14 (paragraph 0132). The solder balls in Hanaoka et al. would increase the height of the package and decrease the planarity."

This argument is respectfully deemed unpersuasive because Hanaoka is not relied on in the rejection for a disclosure of external terminals 24. Moreover, applicant's allegation that solder balls in Hanaoka would increase the height of the package and decrease the planarity is unsupported by proof or a showing of facts; hence, it essentially amounts to mere conjecture and it is of no probative value. See MPEP 716.01(c), and, Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989) (statement in publication dismissing the "preliminary identification of a human b - NGF - like molecule" in the prior art, even if considered to be an expert opinion, was inadequate to overcome the rejection based on that prior art because there was no factual evidence supporting the statement); In re Beattie, 974 F.2d 1309, 24 USPQ2d 1040 (Fed. Cir. 1992) (declarations of seven persons skilled in the art offering opinion evidence praising the merits of the claimed invention were found to have little value because of a lack of factual support); Ex parte George, 21 USPQ2d 1058 (Bd. Pat. App. & Inter. 1991) (conclusory statements that results were "unexpected," unsupported by objective factual evidence, were considered but were not found to be of substantial evidentiary value). In any case, at paragraph 133, Hanaoka discloses, "the external terminal 24, such as a solder ball is not needed necessarily; a semiconductor module may be configured by mounting the semiconductor device on a substrate."

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

For information on the status of this application applicant should check PAIR:
Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alternatively, applicant may contact the File Information Unit at (703) 308-2733. Telephone status inquiries should not be directed to the examiner. See MPEP 1730VIC, MPEP 203.08 and MPEP 102.

Any other telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (571) 272-1930. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.
The fax phone number for group 2800 is (571) 273-8300.

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D.G.
11-May-06